UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/837,731	04/18/2001	Miles Gordon Bader	NEC OSP-10546	9086

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EXAMINER
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ART UNIT	PAPER NUMBER
2124	6

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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

		Application No	Applicant(s)	
Office Action Summary		09/837,731	BADER, MILES GORDON	
		Examiner	Art Unit	
		Insun Kang	2124	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *4/18/01, 7/20/01 and 8/15/2003* .

2a)☐ This action is **FINAL.** 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 2* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 2* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 April 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☒ Some * c)☐ None of:

      1.☒ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date *1, 4 and 5* .

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____ .

DETAILED ACTION

1. This action is responding to application papers dated 4/18/01, 7/20/01 and
8/15/2003.

2. Claims 1 and 2 are pending in the application.

Drawings

3.   The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4)
because reference character "522" has been used to designate both "Write back" and
"Read back" in Figure 4. A proposed drawing correction or corrected drawings are
required in reply to the Office action to avoid abandonment of the application. The
objection to the drawings will not be held in abeyance.

4.   The drawings are objected to because there are typographical errors is Figure 8:
"B20" and "B40." They need to be changed to 820 and 840 according to the instant
specification. A proposed drawing correction or corrected drawings are required in reply
to the Office action to avoid abandonment of the application. The objection to the
drawings will not be held in abeyance.

5.   The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5)
because they do not include the following reference sign(s) mentioned in the
description: "452." A proposed drawing correction or corrected drawings are required in
reply to the Office action to avoid abandonment of the application. The objection to the
drawings will not be held in abeyance.

Specification

6.   Applicant is reminded of the proper content of an abstract of the disclosure.

A patent abstract is a concise statement of the technical disclosure of the patent and should include that which is new in the art to which the invention pertains. If the patent is of a basic nature, the entire technical disclosure may be new in the art, and the abstract should be directed to the entire disclosure. If the patent is in the nature of an improvement in an old apparatus, process, product, or composition, the abstract should include the technical disclosure of the improvement. In certain patents, particularly those for compounds and compositions, wherein the process for making and/or the use thereof are not obvious, the abstract should set forth a process for making and/or use thereof. If the new technical disclosure involves modifications or alternatives, the abstract should mention by way of example the preferred modification or alternative.

The abstract should not refer to purported merits or speculative applications of the invention and should not compare the invention with the prior art.

Where applicable, the abstract should include the following:
(1) if a machine or apparatus, its organization and operation;
(2) if an article, its method of making;
(3) if a chemical compound, its identity and use;
(4) if a mixture, its ingredients;
(5) if a process, the steps.

Extensive mechanical and design details of apparatus should not be given.

The abstract does not contain sufficient description of the invention.

Claim Objections

7.   Claims 1 and 2 are objected to because of the following informalities: Per claims

1 and 2, there are typographical errors, "Singe" in claim 1 and "SSA-variable" in claim 2.

They need to be corrected to "Single" and "SSA variable." Also, in claim 2, "read-back;

copy" needs to be corrected to "read-back copy." Appropriate correction is required.

Claim Rejections - 35 USC § 112

8.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly
> claiming the subject matter which the applicant regards as his invention.

9.   Claims 1 and 2 are rejected under 35 U.S.C. 112, second paragraph, as being

indefinite for failing to particularly point out and distinctly claim the subject matter which

applicant regards as the invention.

The terms "normally" in claim 1 and "possible" in claim 2 are relative terms, which

render the claims indefinite. The terms "normally" and "possibly" are not defined by the

claims, the specification does not provide a standard for ascertaining the requisite

degree, and one of ordinary skill in the art would not be reasonably apprised of the

scope of the invention. Appropriate correction is required.

Claim 2 recites the limitation "the function" in line 8. There is insufficient

antecedent basis for this limitation in the claim.

10.   Claims 1 and 2 are rejected as failing to define the invention in the manner

required by 35 U.S.C. 112, second paragraph.

The claim(s) are narrative in form and replete with indefinite and functional or

operational language. The structure which goes to make up the device must be clearly

and positively specified. The structure must be organized and correlated in such a

manner as to present a complete operative device. The claim(s) must be in one

sentence form only. Note the format of the claims in the patent(s) cited.

For the purpose of examination, the sentence, "SSA form is normally only usable on

funtion local variables," is excluded from claim 1.

As per claim 2, the claim is objected for dependency on the above rejected

parent claim 1.

Claim Rejections - 35 USC § 102

11.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

12.   Claims 1 and 2 are rejected under 35 U.S.C. 102(b) as being anticipated by

Chow et al.(US Patent 5,768,596) hereinafter referred to as "Chow."

Per claim 1:

Chow discloses:

-avoiding excessive overhead by a programmed computer while using a form of

SSA(Static Single Assignment) extended to use storage locations other than local

variables("method for a compiler to reduce the overhead in SSA representation in the

presence of aliases...representing indirect memory operations together with ordinary

scalar variables in SSA form," col 3 lines 26-40)

- allowing a program to use a compiler representation known as SSA form on any

memory location addressable by the program ("representing indirect memory

operations, together with ordinary scalar variables in SSA form...building a uniform SSA

representation of all the scalar and indirect memory operations of the program based on

global value numbering," col 3 lines 38-56; see also col 1 lines 1-11, 22-24 and 56-67)

as claimed.

Per claim 2:

The rejection of claim 1 is incorporated, and further, Chow discloses:

-inserting phi functions at any place in the function where multiple definitions of a same

non-SSA variable may be merged, the phi-functions producing a new definition of the

variable at a point where they are inserted (When several definitions of a variable a_1,

a_2,...a_m, reach a merging node in the control flow graph of the program, a ϕ function

assignment statement, an $= \phi(a_1,... a_m)$ is inserted to merge them into the definition of a

new variable version a_n," col 1 lines 40-50)

-finding which operations may implicitly read or write complex variables that are in SSA

form ("Hash expression trees bottom up into the hash table, searching for any existing

matching entry before creating each new value number and entry," col 15 lines 55-67

and col 16 lines 1-14)

-adding write-back copy operations at appropriate locations to write complex variables

that are in SSA form, the write-back copy operations writing an SSA variable back to its

real location ("traversal up the use-def chain of the virtual variable starting from the

current version to look for occurrences of the same ivar node that are unaffected by

sotres associated with the same virtual variable...processing the program in a pre-order

traversal of the dominator tree of the control flow graph guarantees that the earlier

definitions are always processed...Also make the var or ivar node point back to its

defining statement," col 16 lines 1-8)

-adding read-back copy operations at appropriate locations to read possibly modified

values back into new SSA definitions, the read-back copy operations defining a new

SSA variable from a variable's real location (col 12 lines 45-67;col 16 lines 53-65)

-replacing every non-SSA variable definition by a definition of a unique SSA-variable,

and replacing every non-SSA variable reference by a reference to an appropriate SSA-

variable ("The algorithm is then applied to compute SSA form for all the scalar and

indirect variables ...the resulting SSA representation must have each occurrence of an

indirect variable annotated with ...virtual variable," col 12 lines 45-67)

as claimed.

13.   Claims 1 and 2 are rejected under 35 U.S.C. 102(b) as being anticipated by

Radigan (US Patent 5,999,735).

Per claim 1:

Radigan discloses:

-avoiding excessive overhead by a programmed computer while using a form of

SSA(Static Single Assignment) extended to use storage locations other than local

variables("Proper placement of phi-nodes may reduce the compiler execution time and

...reduce the execution time of the computer programs...inefficient to place phi-nodes at

every join point in the SSA intermediate language. A more optimal method may be placing a phi-node immediately preceding all statement nodes that contain a use that has multiple reaching definitions," col 8 lines 61-67; a method of creating a rank-n static single assignment intermediate language from a rank-(n-1) static single assignment intermediate language," col 5 lines 15-25)

- allowing a program to use a compiler representation known as SSA form on any memory location addressable by the program ("a method of creating a rank-n static single assignment intermediate language from a rank-(n-1) static single assignment intermediate language," col 5 lines 15-25)

as claimed.

Per claim 2:

The rejection of claim 1 is incorporated, and further, Radigan discloses:

-inserting phi functions at any place in the function where multiple definitions of a same non-SSA variable may be merged, the phi-functions producing a new definition of the variable at a point where they are inserted ("placing a phi-node immediately preceding all statement nodes that contain a use that has multiple reaching definitions," col 8 lines 61-67;

-finding which operations may implicitly read or write complex variables that are in SSA form ("If a statement node that contains a rank-0 definition that reaches a statement node containing a rank-0 use is found during the depth-first search, then the rank-0 definition and the rank-0 use are renamed with a temp," col 9 lines 12-58)

-adding write-back copy operations at appropriate locations to write complex variables

that are in SSA form, the write-back copy operations writing an SSA variable back to its

real location (see Fig 3 Rank-1 SSA Intermediate Language and Rank-2 SSA

intermediate language control flow diagram)

-adding read-back copy operations at appropriate locations to read possibly modified

values back into new SSA definitions, the read-back; copy operations defining a new

SSA variable from a variable's real location(see Fig 3 Rank-1 SSA Intermediate

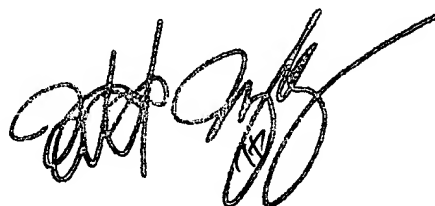Language and Rank-2 SSA intermediate language control flow diagram)

-replacing every non-SSA variable definition by a definition of a unique SSA-variable,

and replacing every non-SSA variable reference by a reference to an appropriate SSA-

variable ("when a rank-n... SSA intermediate language is created, $B[t_5]$ will be renamed

to t_6 in the rank-1 definition and the rank-1 use," col 10 lines 63-67)

as claimed.

14.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Insun Kang whose telephone number is 703-305-6465.

The examiner can normally be reached on M-F 8:30-5:30.

     If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Kakali Chaki can be reached on 703-305-9662. The fax phone number for

the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

IK
4/13/2004

TODD INGBERG
PRIMARY EXAMINER